# Appendix C.3 Health and Safety

### TABLE OF CONTENTS

<u>Section</u>			<u>Page</u>
Appendix	C.3 He	ealth and Safety	C.3-1
	C.3.1	Introduction	C.3-1
	C.3.2	Radiological Health Impacts	C.3-1
		C.3.2.1 Waste Processing	C.3-1
		C.3.2.2 Facility Disposition	C.3-8
	C.3.3	Nonradiological Health Impacts	C.3-8
	C.3.4	Occupational Health and Safety Impacts	C.3-9
		C.3.4.1 Waste Processing	C.3-9
		C.3.4.2 Facility Disposition	C.3-9
	Refere	nces	C.3-36
		LIST OF TABLES	
<u>Table</u>			<u>Page</u>
C.3-1	Estimated	radiological impacts during construction activities to	
		vorkers by project.	C.3-2
C.3-2		radiological impacts during operations to involved workers	
	by project.		C.3-3
C.3-3	• •	fety during construction - peak year employment levels.	C.3-10
C.3-4		worker injury impacts during construction activities of new	
		t INEEL by alternative.	C.3-11
C.3-5	Worker sat	fety during operations - peak year employment levels.	C.3-16
C.3-6	Estimated	worker injury impacts during operations activities of new	
	facilities at	t INEEL by alternative.	C.3-17
C.3-7	Estimated	worker injury impacts during disposition activities of new	
	facilities at	t INEEL by alternative.	C.3-24
C.3-8	Estimated	radiological impacts for disposition of existing facilities	
	by project.		C.3-25
C.3-9		radiological impacts to involved workers during disposition	
		for new facilities.	C.3-28
C.3-10		worker injury impacts during disposition activities of new	
	facilities at	t INEEL by alternative	C 3-32

**C.3-iii** DOE/EIS-0287

## Appendix C.3 Health and Safety

#### C.3.1 INTRODUCTION

Health and safety impacts to workers and the public can arise from various work-related activities associated with waste processing and facility disposition. Health impacts that were evaluated in this environmental impact statement (EIS) include those resulting from radiological and non-radiological activities and have been presented for the following three types of impacts:

- Radiological health impacts were evaluated for all radiological workers involved with waste processing and facility disposition based on the likelihood of developing a latent cancer fatality (LCF) from worker exposure to radiological air and surface contaminants. Radiological health impacts from facility emissions were also evaluated for the general public, maximally exposed individual, and noninvolved worker.
- Non-radiological health impacts were presented in terms of the hazard quotient for each type of carcinogenic and noncarcinogenic toxic air pollutant for all workers involved with waste processing and facility disposition activities and the public using estimated site boundary pollutant concentration levels.
- Occupational health and safety impacts were evaluated for all workers involved with waste processing and facility disposition activities based on historical injury and illness data at the Idaho National Engineering and Environmental Laboratory (INEEL).

These health impacts and the methodologies and results used to obtain them are presented in Sections 5.2.10 and 5.3.8 of this EIS. Groundwater impacts are not part of this appendix. They are addressed in Section 5.3.8.2 and Appendix C.9 of this EIS.

#### C.3.2 RADIOLOGICAL HEALTH IMPACTS

For calculating worker radiological health impacts, Project Data Summaries and supporting Engineering Design Files (see Appendix C.6) were used as sources of information on the number of radiological workers and estimated average radiation dose per worker, and duration of each project within a specific option or alternative. Data were then used to determine the annual average collective dose (person-rem), the total project phase collective worker dose (person-rem), and the estimated increase in the number of LCFs from the total collective worker dose. The LCF value is calculated by multiplying the total collective worker dose by the appropriate dose-to-risk conversion factor based on the 1993 Limitations of Exposure to Ionizing Radiation (NCRP 1993). These risk factors are 0.0005 and 0.0004 LCFs per personrem of radiation exposure to the general public and worker population, respectively. The factor for the population is slightly higher due to the presence of infants and children, who are more sensitive to radiation than the adult worker population. Data on worker radiological health impacts are presented separately for construction, operations, and disposition activities.

Radiological health impacts from facility emissions are presented for the maximally exposed offsite individual, the maximally exposed onsite worker, and the general public. Estimates of radiological dose are presented in Sections 5.2.6 and 5.3.4. These doses are then integrated for the duration of the project phase for each category above. LCF estimates are calculated for the population based on the total collective dose.

#### C.3.2.1 Waste Processing

Table C.3-1 provides radiological dose and LCFs during construction activities by project. Data are presented in terms of annual and integrated impacts to involved workers.

Table C.3-2 provides radiological dose and LCFs during operations activities by project. Data are presented in terms of annual and integrated impacts to involved workers.

C.3-1 DOE/EIS-0287

Table C.3-1. Estimated radiological impacts during construction activities to involved workers by project.

	workers by project.					
		Radiation		m . 1	Collective	Estimated
D	Demoniation	workers/	Construction	Total	dose <sup>b</sup>	increase in laten
Project	Description	year <sup>a</sup>	time <sup>a</sup> (years)  Alternative	workers	(person-rem)	cancer fatalities
P1E	Bin Set 1 Calcine Transfer	21	7	<u>150</u>	<u>37</u>	<u>0.015</u>
Totals	Biii Set i Caleine Transier	21	,	150 150	<u>37</u> 37	$\frac{0.015}{0.015}$
Totals	Continue	ed Current O	perations Alter		3/	0.013
P1A	Calcine SBW including New Waste	48	5	240	60	0.024
1 171	Calcining Facility Upgrades	70	3	240	00	0.024
P1E	Bin Set 1 Calcine Transfer	21	7	<u>150</u>	<i>37</i>	<u>0.015</u>
Totals				390	37 97	0.039
		Full Separa	tions Option			
P59A	Calcine Retrieval and Transport	90	6	540	140	0.054
P27	Class A Grout Disposal in a Low-	6	24.75	<u>150</u>	<u>37</u>	<u>0.015</u>
	Activity Waste Disposal Facility					
Totals				690	170	0.069
			asis Option			
P1A	Calcine SBW including New Waste	48	5	240	60	0.024
P59A	Calcining Facility Upgrades Calcine Retrieval and Transport	90	6	5.10	140	0.054
Totals	Calcine Retrieval and Transport	90	0	<u>540</u> 780	$\frac{140}{200}$	$\frac{0.054}{0.078}$
Totals	Tra	insuranic Ser	parations Option		200	0.070
P59A	Calcine Retrieval and Transport	90	6	540	140	0.054
P27	Class C Grout Disposal in a Low-	6	24.75	<u>150</u>	<u>37</u>	<u>0.015</u>
	Activity Waste Disposal Facility					
Totals				690	170	0.069
		sostatic Pres	sed Waste Opti	on		
P1A	Calcine SBW including New Waste	48	5	240	60	0.024
D50.4	Calcining Facility Upgrades	0.0			4.0	0.0-1
P59A	Calcine Retrieval and Transport	90	6	<u>540</u> 780	$\frac{140}{200}$	0.054
Totals	D	iraat Camant	Waste Option	700	200	0.078
P1A	Calcine SBW including New Waste	48	5	240	60	0.024
ГІА	Calcining Facility Upgrades	40	3	240	00	0.024
P59A	Calcine Retrieval and Transport	90	6	<u>540</u>	140	<u>0.054</u>
Totals				$\frac{280}{780}$	$\frac{200}{200}$	$\frac{0.078}{0.078}$
	]	Early Vitrific	cation Option			
P59A	Calcine Retrieval and Transport	90	6	<u>540</u>	<u>140</u>	<u>0.054</u>
Totals				540	140	0.054
			ming Option			
P59A	Calcine Retrieval and Transport	90	6	<u>540</u>	<u>140</u>	<u>0.054</u>
Totals				540	140	0.054
705			ocessing Alterr			
P27	Class A Grout Disposal in a Low-	6	24.75	150	37	0.015
P59A	Activity Waste Disposal Facility Calcine Retrieval and Transport	90	6	510	140	0.054
Totals	Calcine Renieval and Hansport	90	O	<u>540</u> 690	<u>140</u> 170	$\frac{0.054}{0.069}$
101113	Vitrification	without Cal	lcine Separatio			0.009
P59A	Calcine Retrieval and Transport	90	<u>6</u>	<u>540</u>	<u>140</u>	0.054
Totals	Careine Reinevai una Transport	70	U	540 540	$\frac{140}{140}$	$\frac{0.034}{0.054}$
	Vitrification	n with Calc	ine Separations			••••
P59A	Calcine Retrieval and Transport	90	6	<u>540</u>	<u>140</u>	<u>0.054</u>
Totals			-	<del>540</del>	140	$\frac{0.054}{0.054}$

a. Source: Project Data Sheets in Appendix C.6.

b. Based on INEEL statistics for construction workers of 0.25 rem per year.

c. Represents the number of latent cancer fatalities in addition to the baseline national cancer mortality rate. See text box, "Assessment of the Health Effects of Ionizing Radiation" in Section 5.2.9.

Table C.3-2. Estimated radiological impacts during operations to involved workers by project.

No Action Alternative	Project	Description	Radiation workers/ year	Processing times (years)	Total workers	Collective dose (person-rem)	Estimated increases in latent cancer fatalities
PIE   Bin Set 1 Calcine Transfer   17   1   17   3.2   1.3×10³     PISMC   Remote Analytical Laboratory   10   29   290   55   0.022     Operations	-	•	No Action	Alternative			
Paragraphic	P1D	No Action Alternative	42	36	1.5×10 <sup>3</sup>	290	0.11
Continued Current Operations	P1E	Bin Set 1 Calcine Transfer	17	1	<i>17</i>	3.2	1.3×10 <sup>-3</sup>
Continued Current Operations Alternative	P18MC		10	29	<u>290</u>	<u>55</u>	<u>0.022</u>
Place   Calcine SBW including New Waste   96   6   580   110   0.044	Totals				$1.8 \times 10^{3}$	350	0.14
Calcining Facility Upgrades Newly-Generated Liquid Waste and Tank Farm Heel Waste Management PIE Bin Set I Calcine Transfer 17 1 17 3.2 1.3×10³ PISMC Remote Analytical Laboratory 10 29 290 55 0.022 Operations  Full Separations Option  Full Separations Option  Full Separations Option  P9A Full Separations 30 21 630 120 0.048 P9B Vitrification Plant 40 20 800 150 0.061 P9C Class A Grout Plant 16 21 340 64 0.026 P18 New Analytical Laboratory 30 21 630 120 0.048 P24 Vitrified Product Interim Storage 5 20 100 19 7.6×10³ P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10³ P1B Separations Organic Incinerator 8.5 21 180 34 0.014 P27 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068		Continu	ed Current C	Operations Alte	rnative		
Tank Farm Heel Waste Management PIE Bin Set 1 Calcine Transfer 17 1 17 3.2 1.3×10³ PIBMC Remote Analytical Laboratory 10 29 290 55 0.022 Operations  Fotals  Full Separations Option  OPS Vitrification Plant 40 20 800 150 0.061 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Laboratory 30 21 630 120 0.048 PIB New Analytical Interim Storage 5 20 100 19 7.6×10³ PIB Separations Organic Interim to a Geologic Repository PIB PIB Separations Organic Incinerator 8.5 21 180 34 0.014 PIB Separations Organic Inci	P1A		96	6		110	0.044
Planck   Remote Analytical Laboratory   10   29   290   55   0.022	P1B	Tank Farm Heel Waste	60	21	$1.3 \times 10^3$	240	0.096
Potals   P	P1E	Bin Set 1 Calcine Transfer	17	1	17	3.2	1.3×10 <sup>-3</sup>
Full Separations Option   Full Separations	P18MC		10	29	<u>290</u>	<u>55</u>	<u>0.022</u>
P9A Full Separations 30 21 630 120 0.048 P9B Vitrification Plant 40 20 800 150 0.061 P9C Class A Grout Plant 16 21 340 64 0.026 P18 New Analytical Laboratory 30 21 630 120 0.048 P24 Vitrified Product Interim Storage 5 20 100 19 7.6×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> P118 Separations Organic Incinerator 8.5 21 180 34 0.014 P27 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068	Totals	Operations			2.1×10 <sup>3</sup>	410	0.16
P9B Vitrification Plant 40 20 800 150 0.061 P9C Class A Grout Plant 16 21 340 64 0.026 P18 New Analytical Laboratory 30 21 630 120 0.048 P24 Vitrified Product Interim Storage 5 20 100 19 7.6×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> HLW at INTEC for Shipment to a Geologic Repository P29A Calcine Retrieval and Transport 10 20 200 38 0.015 P118 Separations Organic Incinerator 8.5 21 180 34 0.014 P27 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068			Full Separa	tions Option			
P9C Class A Grout Plant 16 21 340 64 0.026 P18 New Analytical Laboratory 30 21 630 120 0.048 P24 Vitrified Product Interim Storage 5 20 100 19 7.6×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> P35P Calcine Retrieval and Transport 10 20 200 38 0.015 P318 Separations Organic Incinerator 8.5 21 180 34 0.014 P327 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P35D Class A Grout Packaging and 8 21 170 32 0.013 P35D Shipping to a Low-Activity Waste Disposal Facility P33 Waste Treatment Pilot Plant 33 27 890 170 0.068	P9A	Full Separations	30	21	630	120	0.048
New Analytical Laboratory   30   21   630   120   0.048     P24   Vitrified Product Interim Storage   5   20   100   19   7.6×10 <sup>-3</sup>     P25A   Packaging and Loading Vitrified   6   20   120   23   9.1×10 <sup>-3</sup>     HLW at INTEC for Shipment to a Geologic Repository     P39A   Calcine Retrieval and Transport   10   20   200   38   0.015     P118   Separations Organic Incinerator   8.5   21   180   34   0.014     P27   Class A Grout Disposal in a Low-Activity Waste Disposal Facility     P35D   Class A Grout Packaging and   8   21   170   32   0.013     Shipping to a Low-Activity Waste Disposal Facility     P133   Waste Treatment Pilot Plant   33   27   890   170   0.068     P134   O.048   O.048     O.048   O.049   O.068     O.048   O.049   O.048     O.048   O.049   O.068     O.048   O.049   O.048     O.048   O.049   O.068     O.048   O.049	P9B	Vitrification Plant	40	20	800	150	0.061
P224 Vitrified Product Interim Storage 5 20 100 19 7.6×10 <sup>-3</sup> P25A Packaging and Loading Vitrified 6 20 120 23 9.1×10 <sup>-3</sup> HLW at INTEC for Shipment to a Geologic Repository P59A Calcine Retrieval and Transport 10 20 200 38 0.015 P118 Separations Organic Incinerator 8.5 21 180 34 0.014 P27 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P135 Class A Grout Packaging and 8 21 170 32 0.013 Shipping to a Low-Activity Waste Disposal Facility P136 Waste Treatment Pilot Plant 33 27 890 170 0.068	P9C	Class A Grout Plant	16	21	340	64	0.026
Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository Calcine Retrieval and Transport Calcine Ret	P18	New Analytical Laboratory	30	21	630	120	0.048
HLW at INTEC for Shipment to a Geologic Repository Calcine Retrieval and Transport  P118 Separations Organic Incinerator Class A Grout Disposal in a Low-Activity Waste Disposal Facility Class A Grout Packaging and Shipping to a Low-Activity Waste Disposal Facility  P133 Waste Treatment Pilot Plant  33 27 890 170 0.068	P24	Vitrified Product Interim Storage	5	20	100	19	7.6×10 <sup>-3</sup>
P138 Calcine Retrieval and Transport 10 20 200 38 0.015 P118 Separations Organic Incinerator 8.5 21 180 34 0.014 P27 Class A Grout Disposal in a Low-Activity Waste Disposal Facility P138 Class A Grout Packaging and 8 21 170 32 0.013 Shipping to a Low-Activity Waste Disposal Facility P138 Waste Treatment Pilot Plant 33 27 890 170 0.068	P25A	HLW at INTEC for Shipment to a	6	20	120	23	9.1×10 <sup>-3</sup>
Class A Grout Disposal in a Low-Activity Waste Disposal Facility Class A Grout Packaging and 8 21 170 32 0.013 Shipping to a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068	P59A		10	20	200	38	0.015
Activity Waste Disposal Facility Class A Grout Packaging and 8 21 170 32 0.013 Shipping to a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068	P118	Separations Organic Incinerator	8.5	21	180	34	0.014
Shipping to a Low-Activity Waste Disposal Facility P133 Waste Treatment Pilot Plant 33 27 890 170 0.068	P27	Activity Waste Disposal Facility	2.5		53	10	
	P35D	Shipping to a Low-Activity Waste	8	21	170	32	0.013
Totals $4.1 \times 10^3 780 0.31$	P133		33	27		<u>170</u>	<u>0.068</u>
	Totals				$4.1\times10^3$	780	0.31

C.3-3 DOE/EIS-0287

Table C.3-2. Estimated radiological impacts during operations to involved workers by project (continued).

Project	Description	Radiation workers/ year	Processing times (years)	Total workers	Collective dose (person-rem)	Estimated increases in laten cancer fatalities
	_	Planning E	Basis Option			
P1A	Calcine SBW including New Waste	96	6	580	110	0.044
P1B	Calcining Facility Upgrades Newly Generated Liquid Waste and Tank Farm Heel Waste	60	21	$1.3 \times 10^{3}$	240	0.096
P59A	Management Calcine Retrieval and Transport	10	16	160	30	0.012
P23A	Full Separations	30	16	480	91	0.012
P23A P23B	Vitrification Plant	40	15	600	110	0.036 0.046
P23B P23C	Class A Grout Plant		16	260	49	
		16				0.019
P24	Interim Storage of Vitrified Waste	5	20	100	19	$7.6 \times 10^{-3}$
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	6	20	120	23	9.1×10 <sup>-3</sup>
P18	New Analytical Laboratory	30	21	630	120	0.048
P118	Separations Organic Incinerator	8.5	16	140	26	0.010
P35 <b>E</b>	Class A Grout Packaging and Loading for Offsite Disposal	8	16	130	24	9.7×10 <sup>-3</sup>
P133	Waste Treatment Pilot Plant	33	21	<u>690</u>	<u>130</u>	<u>0.053</u>
Totals				$5.1 \times 10^3$	980	0.39
	Tra	insuranic Se	parations Option	on		
P18	New Analytical Laboratory	30	21	630	120	0.048
P39A	Shipping Transuranic Waste from INTEC to the Waste Isolation Pilot Plant	2.5	21	53	10	4.0×10 <sup>-3</sup>
P49A	Transuranic/Class C Separations	50	21	$1.1 \times 10^{3}$	200	0.080
P49C	Class C Grout Plant	16	21	340	64	0.026
P59A	Calcine Retrieval and Transport	10	21	210	40	0.016
P118	Separations Organic Incinerator	8.5	21	180	34	0.014
P27	Class A Grout Disposal in a Low- Activity Waste Disposal Facility	2.5	21	53	10	4.0×10 <sup>-3</sup>
P49D	Class C Grout Packaging and Shipping to a Low-Activity Waste Disposal Facility	8.5	21	180	34	0.014
P133	Waste Treatment Pilot Plant	33	27	<u>890</u>	<u>170</u>	<u>0.068</u>
Totals				$3.6 \times 10^{3}$	680	0.27

Table C.3-2. Estimated radiological impacts during operations to involved workers by project (continued).

Project	Description	Radiation workers/ year	Processing times (years)	Total workers	Collective dose (person-rem)	Estimated increases in latent cancer fatalities
	Hot 1	sostatic Pres	ssed Waste Op	tion		
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	96	6	580	110	0.044
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	60	21	$1.3 \times 10^3$	240	0.096
P18	New Analytical Laboratory	30	21	630	120	0.048
P59A	Calcine Retrieval and Transport	10	21	210	40	0.016
P71	Mixing and Hot Isostatic Pressing	22	21	460	88	0.035
P72	Interim Storage of Hot Isostatic Pressed Waste	2.5	21	53	10	4.0×10 <sup>-3</sup>
P73A	Packaging and Loading Hot Isostatic Pressed Waste at INTEC for Shipment to a Geologic Repository	2.5	20	50	9.5	3.8×10 <sup>-3</sup>
P133	Waste Treatment Pilot Plant	33	27	890	<u>170</u>	<u>0.068</u>
Totals				$4.1 \times 10^{3}$	790	0.31
	D	irect Cemen	t Waste Option	1		
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	96	6	580	110	0.044
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	60	21	$1.3 \times 10^3$	240	0.096
P18	New Analytical Laboratory	30	21	630	120	0.048
P59A	Calcine Retrieval and Transport	10	21	210	40	0.016
P80	Direct Cement Process	93	21	$2.0 \times 10^{3}$	370	0.15
P81	Unseparated Cementitious HLW Interim Storage	4.5	21	95	18	7.2×10 <sup>-3</sup>
P83A	Packaging and Loading Cementitious Waste at INTEC for Shipment to a Geologic Repository	2.5	20	50	9.5	3.8×10 <sup>-3</sup>
P133 Totals	Waste Treatment Pilot Plant	33	27	$\frac{890}{5.7\times10^3}$	$\frac{170}{1.1\times10^3}$	<u>0.068</u> 0.43

C.3-5 DOE/EIS-0287

Table C.3-2. Estimated radiological impacts during operations to involved workers by project (continued).

	project (continued).					
Project	Description	Radiation workers/ year	Processing times (years)	Total workers	Collective dose (person-rem)	Estimated increases in latent cancer fatalities
		Early Vitrifi	cation Option			
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal	28	36	1.0×10 <sup>3</sup>	190	0.077
P18	New Analytical Laboratory	30	21	630	120	0.048
P59A	Calcine Retrieval and Transport	10	21	210	40	0.016
P61	Vitrified HLW Interim Storage	4.5	21	95	18	7.2×10 <sup>-3</sup>
P62A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	2.5	20	50	9.5	3.8×10 <sup>-3</sup>
P88	Early Vitrification with Maximum Achievable Control Technology	39	21	820	160	0.062
P90A	Packaging and Loading Vitrified SBW at INTEC for Shipment to the Waste Isolation Pilot Plant	2.5	20	50	9.5	3.8×10 <sup>-3</sup>
P133	Waste Treatment Pilot Plant	33	27	<u>890</u>	<u>170</u>	<u>0.068</u>
Totals				$3.8\times10^3$	710	0.29
		Steam Refor	rming Option			
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	36	1.0×10 <sup>3</sup>	190	0.077
<i>P18MC</i>	Remote Analytical Laboratory Operation	10	29	290	55	0.022
P59A	Calcine Retrieval and Transport	10	20	200	38	0.015
P117A	Calcine Packaging and Loading to Hanford	44	24.25	1.1×10 <sup>3</sup>	200	0.081
P2001	NGLW Grout Facility	22	22.25	490	93	0.037
P35E	Grout Packaging and Loading for Offsite Disposal	8	22.25	180	34	0.014
P2002A	Steam Reforming	40	2	<u>80</u>	<u>15</u>	6.1×10 <sup>-3</sup>
Totals				$3.3 \times 10^3$	630	0.25

Table C.3-2. Estimated radiological impacts during operations to involved workers by project (continued).

	1 3 (***********************************					
		Radiation			Collective	Estimated
		workers/	Processing	Total	dose	increases in latent
Project	Description	year	times (years)	workers	(person-rem)	cancer fatalities
	Minimu	m INEEL P	rocessing Alter	native		
P1C	Process Equipment Waste Evaporator and Liquid Effluent	28	26	730	140	0.055
	Treatment and Disposal					
P18	New Analytical Laboratory	30	21	630	120	0.048
P24	Interim Storage of Vitrified Waste	5	20	100	19	7.6×10 <sup>-3</sup>
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a	6	20	120	23	9.1×10 <sup>-3</sup>
P27	Geologic Repository Class A Grout Disposal in a Low- Activity Waste Disposal Facility	2.5	21	53	10	4.0×10 <sup>-3</sup>
P111	SBW and Newly-Generated Liquid Waste Treatment with Cesium Ion Exchange to Contact-Handled	33	17	560	110	0.043
P112A	Transuranic Grout and Low-Level Waste Grout Packaging and Loading Contact- Handled Transuranic (from SBW and Newly-Generated Liquid Waste Cesium Ion Exchange Grout Treatment) for Shipment to WIPP	2.5	17	43	8.1	3.2×10 <sup>-3</sup>
P59A	Calcine Retrieval and Transport	10	15	150	29	0.011
P117A	Calcine Packaging and Loading to	44	15	660	130	0.050
	Hanford					
P133	Waste Treatment Pilot Plant	33	17	<u>560</u>	<u>110</u>	0.043
Totals				$3.6 \times 10^3$	690	0.27

C.3-7 DOE/EIS-0287

Table C.3-2. Estimated radiological impacts during operations to involved workers by project (continued).

					Collective	Estimated
		Radiation			dose	increases in
		workers/	Processing	Total	(person-	latent cancer
Project	Description	year	times (years)	workers	rem)	fatalities
	Vitrification	ı without Ca	dcine Separati	ons Option		
P1C	Process Equipment Waste	28	36	1.0×10 <sup>3</sup>	190	0.077
	Evaporator and Liquid Effluent					
	Treatment and Disposal Facility					
P18	New Analytical Laboratory	30	21	630	120	0.048
P59A	Calcine Retrieval and Transport	10	13.25	130	25	0.010
P61	Vitrified HLW Interim Storage	4.5	22.25	100	19	$7.6 \times 10^{-3}$
P62A	Packaging and Loading Vitrified	2.5	20	50	10	3.8×10 <sup>-3</sup>
	HLW for Shipment to NGR					
P88	Vitrification with Maximum	39	13.25	520	98	0.039
	Achievable Control Technology					
P133	Waste Treatment Pilot Plant	33	6	200	<u>38</u>	<u>0.015</u>
Totals				$2.6\times10^3$	<del>50</del> 0	0.20
	Vitrification	on with Calc	cine Separation	ns Option		
P1C	Process Equipment Waste	28	36	$1.0 \times 10^3$	190	0.077
	Evaporator and Liquid Effluent					
	Treatment and Disposal Facility					
P9A	Full Separations	30	13.25	400	76	0.030
Р9С	Grout Plant	16	13.25	210	40	0.016
P18	New Analytical Laboratory	30	21	630	120	0.048
P24	Vitrified Product Interim Storage	5	20	100	19	7.6×10 <sup>-3</sup>
P25A	Packaging and Loading Vitrified	6	20	120	23	9.1×10 <sup>-3</sup>
	HLW for Shipment to NGR					
P35E	Grout Packaging and Loading	8	13.25	110	20	8.1×10 <sup>-3</sup>
	for Offsite Disposal					
P59A	Calcine Retrieval and Transport	10	13.25	130	25	0.010
P88	Vitrification with Maximum	39	13.25	520	98	0.039
	Achievable Control Technology					
P133	Waste Treatment Pilot Plant	33	6	200	<u>38</u>	0.015
Totals				$3.4\times10^3$	$6\overline{50}$	0.26
a. Proje	ect data from project data sheets are divided	Linto two phase	25			

Radiological impacts from facility airborne emissions to the maximally exposed onsite and offsite individuals and general population within 50 miles of *INTEC* is based on worker and radiological dose data presented in Appendix C.2, Table C.2-10. Collective population *dose* from Table C.2-10 was multiplied by the dose-to-risk conversion factor of 0.0005 LCFs per personrem of radiation exposure to the general public to determine LCFs in Section 5.2.10.

#### C.3.2.2 Facility Disposition

Section C.3.4.2 discusses radiological impacts for the involved workers by project for the exist-

ing facilities during facility disposition activities.

## C.3.3 NONRADIOLOGICAL HEALTH IMPACTS

For nonradiological health impacts from atmospheric releases, DOE used toxic air pollutant emissions data for each project under an alternative to estimate air concentrations at the INEEL site boundary. For the evaluation of occupational health effects, the modeled chemical concentration is compared with the applicable occupational standard that provides levels at which no adverse effects are expected, yielding a

hazard quotient. The hazard quotient is a ratio between the calculated concentration in air and the applicable standard. For noncarcinogenic toxic air pollutants, if the hazard quotient is less than 1, then no adverse health effects would be expected. If the hazard quotient is greater than 1, additional investigation would be warranted. For carcinogenic toxic air pollutants, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen.

Section 5.2.10 presents the waste processing options with the maximum carcinogenic and noncarcinogenic pollutant maximum concentrations based on data from Appendix C.2, Table C.2-14. Table C.2-14 provides maximum pollutant concentrations by each of the projects within the waste processing options.

## C.3.4 OCCUPATIONAL HEALTH AND SAFETY IMPACTS

Estimates of occupational illness and injury rates for workers involved with the waste processing alternatives are provided in terms of lost workdays and total recordable cases that would occur during a peak employment year and for the entire period of construction and operations for each of the alternatives. The lost workday values represent the number of workdays beyond the day of injury or onset of illness the employee was away from work or limited to restricted work activity because of an occupational injury or illness. The total recordable cases include work-related death, illness, or injury that resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

Historical total recordable cases and lost work-day rates were obtained from the Computerized Accident/Incident Reporting System (CAIRS) database (DOE 2001) for INEEL construction and operations activities over a 5-year period from 1996-2000. Based on the available data, DOE concluded that the overall INEEL rates were representative of both construction and operations. These rates are 28.4 percent for

lost workdays and 3.7 percent for total recordable cases. DOE lost workdays and total recordable cases rates have been trending downward. For example, in 2001, the INEEL rates were 15.4 percent and 2.3 percent for lost workdays and total recordable cases, respectively, compared to 23.0 and 2.3 percent for overall DOE rates.

Section 5.2.10 provides estimates of annual and cumulative lost workdays and total recordable cases by alternative during construction and operations for the waste processing alternatives.

The following information is in support of the worker safety information provided in Section 5.2.10 and 5.3.8 for waste processing and facility disposition respectively:

#### C.3.4.1 Waste Processing

Tables C.3-3 and C.3-4 provide the number of peak-year and total workers and the lost work-days and total recordable cases by project during construction.

Tables C.3-5 and C.3-6 provide the number of peak-year and total workers and the lost work-days and total recordable cases by project during operations.

#### C.3.4.2 Facility Disposition

Table C.3-7 provides peak-year employment and worker safety data *for disposition of new facilities* by alternative. *Alternative* specific employment numbers are provided in Appendix C.1.

Table C.3-8 contains estimated radiological impacts and occupational worker data for *disposition of* existing facilities by project.

Table C.3-9 contains estimated radiological impacts to involved workers during disposition of new facilities.

Table C.3-10 contains estimated worker injury impacts during disposition activities of new facilities.

C.3-9 DOE/EIS-0287

Table C.3-3. Worker safety during construction - peak year employment levels.

			Total recordable
Project	Number of workers <sup>a</sup>	Lost workdays/year	cases/year
No Action Alternative	21	6.0	0.78
Continued Current	89	25	<i>3.3</i>
<b>Operations Alternative</b>			
Separations Alternative			
Full Separations Option	850	240	32
Planning Basis Option	870	250	32
Transuranic Separations	680	190	25
Option			
Non-Separations Alternative			
Hot Isostatic Pressed Waste	360	100	13
Option			
Direct Cement Waste	400	110	15
Option			
Early Vitrification Option	330	93	12
Steam Reforming Option	550	160	20
Minimum INEEL	200	56	<i>7.3</i>
<b>Processing Alternative</b>			
Direct Vitrification			
Alternative			
Vitrification without	350	100	13
Calcine Separations			
<b>Option</b>			
Vitrification with Calcine	670	190	25
Separations Option			-
a. For peak year employment levels, s	ee Appendix C.1.		

Table C.3-4. Estimated worker injury impacts during construction activities of new facilities at INEEL by alternative.

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Construction time (years)	Total LWD	Total TRC
-,			n Alternative	<u> </u>	() *****/	=	
P1E	Bin Set 1 Calcine Transfer	21	6.0	0.78	5	30	3.9
		Continued Current	Operations Alte	ernative			
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	48	14	1.8	4	55	7.1
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	20	5.7	0.74	4	23	3.0
P1E	Bin Set 1 Calcine Transfer	21	6.0	0.78	5	30	3.9
Totals						110	14
		Full Separ	rations Option				
P9A	Full Separations	300	85	11	5	430	56
P9B	Vitrification Plant	280	80	10	5	400	52
P9C	Class A Grout Plant	160	45	5.9	2	91	12
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P24	Interim Storage of Vitrified Waste	110	31	4.1	3.8	120	15
P27	Class A Grout Disposal in a New Low-Activity Waste Disposal Facility	78	22	2.9	7	160	20
P35D	Class A Grout Packaging and Shipping to a Low-Activity Waste Disposal Facility	22	6.2	0.81	4.2	26	3.4
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P118	Separations Organic Incinerator	10	2.8	0.37	3.3	9.4	1.2
P133 Totals	Waste Treatment Pilot Plant	63	18	2.3	4	$\frac{72}{1.5 \times 10^3}$	$\frac{9.3}{190}$
		Planning	Basis Option				
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	48	14	1.8	4	55	7.1
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	20	5.7	0.74	4	23	3.0
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P23A	Full Separations	300	85	11	5	430	56
P23B	Vitrification Plant	280	80	10	5	400	52
P23C	Class A Grout Plant	160	45	5.9	5	230	30
P24	Interim Storage of Vitrified Waste	110	31	4.1	3.75	120	15

Table C.3-4. Estimated worker injury impacts during construction activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Construction time (years)	Total LWD	Total TRC
	2 0001,911011	Planning Basis	1 ,		() (10.00)		
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P118	Separations Organic Incinerator	10	2.8	0.37	3.3	9.4	1.2
P35E	Grout Packaging and Loading for Offsite Disposal	22	6.2	0.81	4	25	3.3
P133	Waste Treatment Pilot Plant	63	18	2.3	4	<u>72</u>	9.3
Totals						$1.5 \times 10^3$	200
		Transuranic S	eparations Opti	ion			
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P27	Class A Grout Disposal in a Low-	78	22	2.9	7	160	20
	Activity Waste Disposal Facility						
P49A	Transuranic Waste /Class C Separations	300	85	11	5	430	56
P49C	Class C Grout Plant	200	57	7.4	5	280	37
P49D	Class C Grout Packaging and Shipping to a Low-Activity Waste Disposal	22	6.2	0.81	4.2	26	3.4
	Facility						
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P118	Separations Organic Incinerator	10	2.8	0.37	3.3	9.4	1.2
P133	Waste Treatment Pilot Plant	63	18	2.3	4	72	9.3
Totals						1.1×10 <sup>3</sup>	150
		Hot Isostatic Pro	essed Waste O <sub>l</sub>	ption			
P1A	Calcine SBW including New Waste	48	14	1.8	4	55	7.1
P1B	Calcining Facility Upgrades Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	20	5.7	0.74	4	23	3.0
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19

Table C.3-4. Estimated worker injury impacts during construction activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Construction time (years)	Total LWD	Total TRC
	Н	ot Isostatic Pressed	Waste Option (	continued)			
P71	Mixing and Hot Isostatic Pressing	100	28	3.7	4	110	15
P72	Interim Storage of Hot Isostatic Pressed Waste	92	26	3.4	3	78	10
P133	Waste Treatment Pilot Plant	63	18	2.3	4	<u>72</u>	9.3
Totals						520	67
		Direct Ceme	nt Waste Optio	n			
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	48	14	1.8	4	55	7.1
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	20	5.7	0.74	4	23	3.0
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P80	Direct Cement Process	130	37	4.8	4	150	19
P81	Unseparated Cementitious Waste Interim Storage	134	38	5.0	4	150	20
P133	Waste Treatment Pilot Plant	63	18	2.3	4	<u>72</u>	9.3
Total						620	81
		Early Vitri	fication Option				
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P61	Vitrified HLW Interim Storage	110	31	4.1	4	130	16
P88	Early Vitrification Facility with Maximum Achievable Control Technology	110	31	4.1	5	160	20
P133 Totals	Waste Treatment Pilot Plant	63	18	2.3	4	<u>72</u> 530	<u>9.3</u> 69

Table C.3-4. Estimated worker injury impacts during construction activities of new facilities at INEEL by alternative (continued).

	arvernative (continued).						
Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Construction time (years)	Total LWD	Total TRC
		Steam Ref	orming Option				
P13	New Storage Tanks	49	14	1.8	2.5	35	4.5
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P117A	Calcine Packaging and Loading	78	22	2.9	4	89	12
P2001	NGLW Grout Facility	50	14	1.9	4	57	7.4
P35E	Grout Packaging and Loading for Offsite Disposal	22	6.2	0.81	4	25	3.3
P2002A	Steam Reforming	295	84	11	5	<u>420</u>	<u>55</u>
Totals						770	100
		Minimum INEEL	Processing Alte	ernative			
P18	New Analytical Laboratory	59	17	2.2	2	34	4.4
P24	Interim Storage of Vitrified Waste	110	31	4.1	3.8	120	15
P27	Class A Grout Disposal in a Low- Activity Waste Disposal Facility	78	22	2.9	7	160	20
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P111	SBW and Newly-Generated Liquid Waste Treatment with Cesium Ion Exchange to Contact-Handled Transuranic Grout and Low-Level Waste Grout	20	5.7	0.74	3	17	2.2
P117A	Calcine Packaging and Loading to Hanford	78	22	2.9	4	89	12
P133 Totals	Waste Treatment Pilot Plant	63	18	2.3	4	$\frac{72}{620}$	9 <u>.3</u> 81

Table C.3-4. Estimated worker injury impacts during construction activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Construction time (years)	Total LWD	Total TRC
	Vi	trification without C	1 /		time (years)	2,1,2	1110
P13	New Storage Tanks	49	14	1.8	2.5	35	4.5
P18	New Analytical Laboratory	59	17	2.2	4	67	8.7
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P61	Vitrified HLW Interim Storage	110	31	4.1	4	130	16
P88	Vitrification with Maximum Achievable	120	34	4.4	8	270	36
	Control Technology						
P133	Waste Treatment Pilot Plant	63	18	2.3	4	72	9.3
Totals						72 710	9.3 93
	V	itrification with Ca	lcine Separation	ns Option			
P9A	Full Separations	300	85	11	5	430	56
P9C	Grout Plant	160	45	5.9	2	91	12
P13	New Storage Tanks	49	14	1.8	2.5	35	4.5
P18	New Analytical Laboratory	59	17	2.2	4	67	8.7
P24	Vitrified Product Interim Storage	110	31	4.1	3.8	120	15
P35E	Grout Packaging and Loading for Offsite	22	6.2	0.81	4	25	3.3
	Disposal						
P59A	Calcine Retrieval and Transport	100	28	3.7	5	140	19
P88	Vitrification with Maximum Achievable	120	34	4.4	8	270	36
	Control Technology						
P133	Waste Treatment Pilot Plant	63	18	2.3	6	110	<u>14</u>
Totals						$1.3 \times 10^{3}$	170

a. LWD = lost workday. The number of workdays beyond the day of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

TRC = total recordable case. A recordable case includes work-related death, illness, or injury which resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

Table C.3-5. Worker safety during operations - peak year employment levels.

Project	Number of workers <sup>a</sup>	Lost workdays/year	Total recordable cases/year
No Action Alternative	73	21	2.7
Continued Current Operations Alternative Separations Alternative	280	79	10
Full Separations Option	440	130	16
Planning Basis Option	480	140	18
Transuranic Separations Option	320	90	12
Non-Separations Alternative			
Hot Isostatic Pressed Waste Option	460	130	17
Direct Cement Waste Option	530	150	19
Early Vitrification Option	330	93	12
Steam Reforming Option	170	49	6.4
Minimum INEEL Processing Alternative Direct Vitrification	330	93	12
Alternative Vitrification without Calcine Separations Option	310	87	11
Vitrification with Calcine Separations Option  a. For peak year employment levels, so	440 ee Appendix C.1.	130	16

Idaho HLW & FD EIS

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative.

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Processing time (years)	Total LWD	Total TRC
		No Action	n Alternative				
P1D	No Action Alternative	62	18	2.3	17	300	39
P1E	Bin Set 1 Calcine Transfer	18	5.1	0.67	17	87	11
P4	Long-Term Storage of Calcine in Bin Sets	3	0.85	0.11	36	31	4.0
P18MC	Remote Analytical Laboratory Operations	52	15	1.9	29	430	<u>56</u>
Totals	•					850	110
		Continued Current	Operations Alte	ernative			
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	150	43	5.6	6	260	33
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	76	22	2.8	5	110	14
P1B(II) <sup>c</sup>	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	56	16	2.1	14	220	29
P1E	Bin Set 1 Calcine Transfer	18	5.1	0.67	17	87	11
P4	Long-Term Storage of Calcine in Bin Sets	3	0.85	0.11	36	31	4.0
P18MC	Remote Analytical Laboratory Operations	52	15	1.9	29	430	<u>56</u>
Totals	•					$1.1 \times 10^{3}$	150
		Full Separ	rations Option				
P9A	Full Separations	120	34	4.4	21	720	93
P9B	Vitrification Plant	90	26	3.3	18	460	60
P9C	Class A Grout Plant	38	11	1.4	21	230	30
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P24	Interim Storage of Vitrified Waste	6.5	1.8	0.24	36	67	8.7
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	7	2.0	0.26	20	40	5.2
P59A	Calcine Retrieval and Transport	11	3.1	0.41	20	63	8.1
P118	Separations Organic Incinerator	8.5	2.4	0.31	21	51	6.6
P27	Class A Grout Disposal in a Low- Activity Waste Disposal Facility	17	4.8	0.63	21	100	13
P35D	Class A Grout Packaging and Shipping to a Low-Activity Waste Disposal Facility	9.5	2.7	0.35	21	57	7.4
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	27	$\frac{300}{3.0 \times 10^3}$	39 400

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

	(**************************************						
D : .	<b>.</b>	Average number	LWD <sup>a</sup>	$TRC^b$	Processing	Total	Total
Project	Description	workers/year	per year	per year	time (years)	LWD	TRC
		Planning	Basis Option				
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	150	43	5.6	6	260	33
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	130	37	4.8	21	780	100
P59A	Calcine Retrieval and Transport	11	3.1	0.41	16	50	6.5
P23A	Full Separations	120	34	4.4	16	550	71
P23B	Vitrification Plant	90	26	3.3	15	380	50
P23C	Class A Grout Plant	38	11	1.4	16	170	23
P24	Interim Storage of Vitrified Waste	6.5	1.8	0.24	36	66	8.7
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	7	2.0	0.26	20	40	5.2
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P118	Separations Organic Incinerator	8.5	2.4	0.31	21	51	6.6
P35E	Grout Packaging and Loading for Offsite Disposal	8.5	2.4	0.31	23	56	7.2
P133	Waste Treatment Pilot Plant	39	11	1.4	27	300	_39
Totals						$3.7 \times 10^{3}$	480
		Transuranic S	eparations Opti	on			
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P27	Class A Grout Disposal in a Low- Activity Waste Disposal Facility	17	4.8	0.63	21	100	13
P39A	Packaging and Loading Transuranic Waste at INTEC for Shipment to the Waste Isolation Pilot Plant	6.5	1.8	0.24	19	35	4.6

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

	directive (continued).						
		Average number	$LWD^{a}$	$TRC^b$	Processing	Total	Total
Project	Description	workers/year	per year	per year	time (years)	LWD	TRC
		Transuranic Separat	ions Option (co	ntinued)			
P49A	Transuranic Waste/Class A Separations	84	24	3.1	21	500	65
P49C	Class C Grout Plant	40	11	1.5	21	240	31
P49D	Class C Grout Packaging and Shipping to a Low-Activity Waste Disposal Facility	8.5	2.4	0.31	21	51	6.6
P59A	Calcine Retrieval and Transport	11	3.1	0.41	21	66	8.5
P118	Separations Organic Incinerator	8.5	2.4	0.31	21	51	6.6
P133	Waste Treatment Pilot Plant	39	11	1.4	27	300	<u>39</u>
Totals						$2.3 \times 10^{3}$	300
		Hot Isostatic Pro	essed Waste Op	otion			
P1A	Calcine SBW including New Waste Calcining Facility Upgrades	150	43	5.6	6	260	33
P1B	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	76	22	2.8	5	110	14
P1B(II) <sup>c</sup>	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	56	16	2.1	14	220	29
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P59A	Calcine Retrieval and Transport	11	3.1	0.41	21	66	8.5
P71	Mixing and Isostatic Pressing	78	22	2.9	21	470	61
P72	Interim Storage Isostatic Pressed Waste	6.5	1.8	0.24	36	67	8.7
P73A	Packaging and Loading Hot Isostatic Pressed Waste at INTEC for Shipment to a Geologic Repository	6.5	1.8	0.24	20	37	4.8
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	27	$\frac{300}{2.5 \times 10^3}$	39 320

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Processing time (years)	Total LWD	Total TRC
-	·	Direct Ceme	ent Waste Option	n	-		
P1A	Calcine SBW including New Waste	150	43	5.6	6	260	33
P1B	Calcining Facility Upgrades Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	76	22	2.8	5	110	14
P1B(II) <sup>c</sup>	Newly-Generated Liquid Waste and Tank Farm Heel Waste Management	56	16	2.1	14	220	29
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P59A	Calcine Retrieval and Transport	11	3.1	0.41	21	66	8.5
P80	Direct Cement Process	140	40	5.2	21	840	110
P81	Unseparated Cementitious HLW Interim Storage	6.5	1.8	0.24	34	63	8.2
P83A	Packaging & Loading Cementitious Waste at INTEC for Shipment to a Geologic Repository	11	3.1	0.41	20	62	8.1
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	27	$\frac{300}{2.9 \times 10^3}$	39 380
		Early Vitri	fication Option				
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	8.0	1.0	36	290	37
P18	New Analytical Laboratory	100	28	3.7	34	970	130
259A	Calcine Retrieval and Transport	11	3.1	0.41	21	66	8.5
P61	Vitrified HLW Interim Storage	6.5	1.8	0.24	36	67	8.7
P62A	Packaging and Loading of Vitrified HLW at INTEC for Shipment to a Geologic Repository	6.5	1.8	0.24	20	37	4.8
P88	Early Vitrification with Maximum Achievable Control Technology	130	37	4.8	21	780	100
P90A	Packaging and Loading Vitrified SBW at INTEC for Shipment to the Waste Isolation Pilot Plant	6.5	1.8	0.24	18	33	4.3
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	27	$\frac{300}{2.5 \times 10^3}$	39 330

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Processing time (years)	Total LWD	Total TRC
		Steam Refe	orming Option				
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	8.0	1.0	36	290	37
P18MC	Remote Analytical Laboratory Operations	52	15	1.9	29	430	56
P59A	Calcine Retrieval and Transport	11	3.1	0.41	20	63	8.1
P117A	Calcine Packaging and Loading	48	14	1.8	25	340	44
P2001	NGLW Grout Facility	25	7.1	0.93	23	160	21
P35E	Grout Packaging and Loading for Offsite Disposal	8.5	2.4	0.31	23	56	7.2
P2002A	Steam Reforming	46	13	1.7	2	<u>26</u>	3.4
Totals						$1.4 \times 10^{3}$	180
		Minimum INEEL	Processing Alte	rnative			
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	8.0	1.0	26	210	27
P18	New Analytical Laboratory	100	28	3.7	34	970	130
P24	Interim Storage of Vitrified Waste	6.5	1.8	0.24	36	67	8.7
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	6	1.7	0.22	20	34	4.4
P27	Class A Grout Disposal in a Low- Activity Waste Disposal Facility	17	4.8	0.63	21	100	13
P59A	Calcine Retrieval and Transport	11	3.1	0.41	15	47	6.1
P111A	SBW and Newly-Generated Liquid Waste Treatment with Cesium Ion Exchange to Contact-Handled Transuranic Grout and Low-Level Waste Grout	33	9.4	1.2	5	47	6.1

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Processing time (years)	Total LWD	Total TRC
-	Mini	mum INEEL Proces	sing Alternative	e (continued)			
P112A	Packaging and Loading Contact- Handled Transuranic Waste for Shipment to WIPP	18	5.1	0.67	15	77	10
P117A	Packaging and Loading Calcine to Hanford	48	14	1.8	15	200	27
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	27	$\frac{300}{2.0 \times 10^3}$	39 270
	Vi	trification without C	alcine Separation	ons Option			
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	8.0	1.0	35	280	36
P18	New Analytical Laboratory	110	31	4.1	21	660	86
P59A	Calcine Retrieval and Transport	11	3.1	0.41	13	41	5.3
P61	Vitrified HLW Interim Storage	6.5	1.8	0.24	22	41	5.3
P62A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	6.5	1.8	0.24	20	37	4.8
P88	Vitrification with Maximum Achievable Control Technology	130	37	4.8	22	810	110
P133 Гotals	Waste Treatment Pilot Plant	39	11	1.4	6	$\frac{67}{1.9 \times 10^3}$	$\frac{8.7}{250}$

Idaho HLW & FD EIS

Table C.3-6. Estimated worker injury impacts during operations activities of new facilities at INEEL by alternative (continued).

Project	Description	Average number workers/year	LWD <sup>a</sup> per year	TRC <sup>b</sup> per year	Processing time (years)	Total LWD	Total TRC
	,	Vitrification with Cal	cine Separation	ns Option			
P1C	Process Equipment Waste Evaporator and Liquid Effluent Treatment and Disposal Facility	28	8.0	1.0	35	280	36
P9A	Full Separations	120	34	4.4	13	440	58
P9C	Grout Plant	38	11	1.4	13	140	18
P18	New Analytical Laboratory	110	31	4.1	21	660	86
P24	Vitrified Product Interim Storage	6.5	1.8	0.24	22	41	5.3
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	7	2.0	0.26	20	40	5.2
P35E	Grout Packaging and Loading for Offsite Disposal	8.5	2.4	0.31	13	31	4.1
P59A	Calcine Retrieval and Transport	11	3.1	0.41	6.0	19	2.4
P88	Vitrification with Maximum Achievable Control Technology	130	37	4.8	22	810	110
P133 Totals	Waste Treatment Pilot Plant	39	11	1.4	6	$\frac{67}{2.5 \times 10^3}$	$\frac{8.7}{330}$

a. LWD = lost workdays. The number of workdays beyond the day of injury or onset of illness that the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

b. TRC = total recordable case. A recordable case includes work-related death, illness, or injury which resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

c. Project data from project data sheets are divided into two phases.

Table C.3-7. Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative.

	Disposit	ioning peak year employmer	nt levels
Project -	Number of workers <sup>a</sup>	Lost workdays/year	Total recordable cases/year
No Action Alternative	0	0	0
Continued Current Operations Alternative Separations Alternative	58	16	2.1
Full Separations Option	790	220	29
Planning Basis Option	660	190	24
Transuranic Separations Option	730	210	27
Non-Separations Alternative			
Hot Isostatic Pressed Waste Option	450	130	17
Direct Cement Waste Option	420	120	15
Early Vitrification Option	320	91	12
Steam Reforming Option	280	<i>79</i>	10
Minimum INEEL Processing Alternative	320	92	12
Direct Vitrification Alternative			
Vitrification without Calcine Separations	340	97	13
Option			
Vitrification with Calcine Separations Option a. For peak year employment levels, s	710	200	26

C.3-25

DOE/EIS-0287

Idaho HLW & FD EIS

Project	Radiological workers per year <sup>a</sup>	Annual collective dose (person-rem) <sup>b</sup>	Number of years	Total collective dose (person-rem)	Increase in latent cancer fatalities
		Tank Farm	1		
Clean Closure	280	70	27	1.9×10 <sup>3</sup>	0.76
Performance-Based Closure	20	5.0	21	110	0.042
Closure to Landfill Standards	12	3.0	17	51	0.020
Performance-Based Closure with Class A Fill	11	2.8	24	66	0.026
Performance-Based Closure with Class C Fill	11	2.8	24	66	0.026
		Tank Farm related	facilities		
CPP-619	0	0	6	0	0
CPP-628	0	0	6	0	0
CPP-638	0	0	2	0	0
CPP-712	0	0	6	0	0
CPP-717	1	0.25	6	<u>1.5</u>	6.0×10 <sup>-4</sup>
Total				1.5	6.0×10 <sup>-4</sup>
		Bin sets			
Clean Closure	58	15	26	380	0.15
Performance-Based Closure	55	14	21	290	0.12
Closure to Landfill Standards	27	6.8	21	140	0.057
Performance-Based Closure with Class A Fill	47	12	17	200	0.080
Performance-Based Closure with Class C Fill	47	12	17	200	0.080
		Bin sets related fa	ncilities		
CPP-639	0	0	6	0	0
CPP-646	0	0	6	0	0
CPP-647	0	0	6	0	0
CPP-658	0	0	6	0	0
CPP-671	0	0	6	0	0
CPP-673	0	0	6	<u>0</u>	<u>0</u>
Total				$\overline{1.5}^{c}$	$6.0 \times 10^{-4}$ c

 $\textit{Table C.3-8. Estimated radiological impacts for \textit{disposition of } existing \textit{ facilities by project (continued)}. \\$ 

	• 1	•	•	• 1 • •	•
	Radiological workers	Annual collective dose		Total collective dose	Increase in latent
Project	per year a	(person-rem) b	Number of years	(person-rem)	cancer fatalities
	Process E	quipment Waste Evapor	ator and related facilit	ties	
CPP-604	25	6.3	6	38	0.015
CPP-605	1	0.25	6	1.5	6.0×10 <sup>-4</sup>
CPP-641	0	0	2	0	0
CPP-649	1	0.25	6	1.5	6.0×10 <sup>-4</sup>
CPP-708	6	1.5	6	9.0	3.6×10 <sup>-3</sup>
CPP-756	1	0.25	6	1.5	6.0×10 <sup>-4</sup>
CPP-1618	1	0.25	6	1.5	6.0×10 <sup>-4</sup>
PEWE Condensate Lines	2	0.50	1	0.5	2.0×10 <sup>-4</sup>
PEWE Condensate Lines and	2	0.50	1	<u>0.5</u>	2.0×10 <sup>-4</sup>
Cell Floor Drain Lines					
Total				54	0.021
	Fuel Processing Bu	ilding and related facili	ties – Performance-Ba	sed Closure	
CPP-601	13	3.3	10	33	0.013
CPP-627	6	1.5	10	15	6.0×10 <sup>-3</sup>
CPP-640	6	1.5	10	<u>15</u>	6.0×10 <sup>-3</sup>
Total				63	0.025
	Fuel Processing Bu	ilding and related facilit	ies – Closure to Landf	ĭll Standards	
CPP-601	10	2.5	10	25	0.010
CPP-627	5	1.3	10	13	5.0×10 <sup>-3</sup>
CPP-640	5	1.3	10		5.0×10 <sup>-3</sup>
Total				13 50	0.020
		FAST and related	facilities		
CPP-666	34	8.5	6	51	0.020
CPP-767	34	8.5	6	<u>51</u>	<u>0.020</u>
Total				$\overline{51}^{d}$	$\overline{0.020}^{d}$

C.3-27

DOE/EIS-0287

Table C.3-8. Estimated radiological impacts for disposition of existing facilities by project (continued).

	• ,	-	•	·   • ·	•
	Radiological workers	Annual collective dose		Total collective dose	Increase in latent
Project	per year <sup>a</sup>	(person-rem) b	Number of years	(person-rem)	cancer fatalities
		Transport Lines	Group		
Process Offgas Lines	1	0.25	1	0.25	1.0×10 <sup>-4</sup>
High-Level Liquid (Raffinate)	0	0	1	0	0
Lines					
Process (Dissolver) Transport	0	0	1	0	0
Lines					
Calcine Solids Transport Lines	0	0	1	<u> </u>	<u> </u>
Total				0.25	1.0×10 <sup>-4</sup>
		Other HLW fac	cilities		
CPP-659					
Performance-Based Closure	35	8.8	3	26	0.011
Closure to Landfill Standards	32	8.0	3	24	9.6×10 <sup>-3</sup>
CPP-684	4	1.0	3	<u>3.0</u>	1.2×10 <sup>-3</sup>
Total				$2\overline{9^e}$	$0.\overline{012^e}$

a. Workers per year of zero occurs when the annual average is much less than one or the workers are accounted for elsewhere.

b. Based on 250 millirem per worker per year.

c. Total is calculated assuming one worker over six years.

d. Disposition of FAST facilities would be accomplished by one project using 34 workers over 6 years. These buildings are listed separately because CPP-666 is Performance-Based Closure and CPP-707 is Clean Closure.

e. Total represents maximum option for CPP-659.

Table C.3-9. Estimated radiological impacts to involved workers during disposition activities for new facilities. a.b.c

Project Number	Description	Radiation workers/ year	Disposition time (years)	Total workers	Collective dose (person- rem)	Estimated increase in latent cancer fatalities
	Continued Current	Operations	Alternative			
P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	37	2	74	19	7.4×10 <sup>-3</sup>
P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	31	2	62	16	$6.2 \times 10^{-3}$
P1B	NGLW and Tank Farm Heel Waste Management	36	1	36	_9	$3.6 \times 10^{-3}$
Totals	S			170	43	0.017
	Full Sepa	rations Option	on			
P9A	Full Separations	100	3	310	77	0.031
P9B	Vitrification Plant	45	3	140	34	0.014
P9C	Class A Grout Plant	74	2.5	190	46	0.019
P18	New Analytical Laboratory	30	2	60	15	$6.0 \times 10^{-3}$
P24	Vitrified Product Interim Storage	3	1.8	5.4	1.4	$5.4 \times 10^{-4}$
P27	Class A Grout Disposal in a New Low-Activity Waste Disposal Facility	88	2	180	44	0.018
P35D	Class A Grout Packaging and Shipping to a New Low-Activity Waste Disposal Facility	20	2	40	10	4.0×10 <sup>-3</sup>
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P118	Separations Organic Incinerator	2	2	4	1.0	4.0×10 <sup>-4</sup>
P133	Waste Treatment Pilot Plant	25	2	50	_13	$5.0 \times 10^{-3}$
Totals				$1.1 \times 10^{3}$	270	0.11
		Basis Optio	n			
P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	37	2	74	19	$7.4 \times 10^{-3}$
P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	31	2	62	16	$6.2 \times 10^{-3}$
P1B	NGLW and Tank Farm Heel Waste Management	36	1	36	9	$3.6 \times 10^{-3}$
P18	New Analytical Laboratory	30	2	60	15	6.0×10 <sup>-3</sup>
P23A	Full Separations	100	3	310	77	0.031
P23B	Vitrification Plant	49	2.8	140	34	0.014
P23C	Class A Grout Plant	67	2.8	190	47	0.019
P24	Vitrified Product Interim Storage	3	1.8	5.4	1.4	$5.4 \times 10^{-4}$
P35E	Class A Grout Packaging and Shipping for Offsite Disposal	20	2	40	10	4.0×10 <sup>-3</sup>
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P118	Separations Organic Incinerator	2	2	4	1	4.0×10 <sup>-4</sup>
P133 Totals	Waste Treatment Pilot Plant	25	2	$\frac{50}{1.1 \times 10^3}$	<u>13</u> 270	5.0×10 <sup>-3</sup> 0.11

Table C.3-9. Estimated radiological impacts to involved workers during disposition activities for new facilities a.b.c (continued).

Project Number         Radiation workers workers         Disposition bileness in increase in in		activities for flew facilities	Convinue	aj.			
P18		Descrition	workers/			dose (person-	increase in latent cancer
P27         Class A Grout Disposal in a New Low-Activity Waste Disposal Facility         49         2         98         25         9.8×10³           P49A         Transuranic/Class C Separations         81         3         240         61         0.024           P49C         Class C Grout Plant         64         2         130         32         0.013           P49D         Class C Grout Packaging and Shipping to a New Low-Activity Waste Disposal Facility         41         2         82         21         8.2×10³           P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P118         Separations Organic Incinerator         2         2         4         1         4.0×10⁴           P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10³           Totals         Hot Isostatic Pressed Waste Option           Hot Isostatic Pressed Waste Option           P1A         Calcine SBW including NWCF Upgrades <sup>6</sup> 31         2         62         16         6.2×10³           P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9         3.6×10³           P59A <td></td> <td>Transuranie</td> <td>Separations (</td> <td>Option</td> <td></td> <td></td> <td></td>		Transuranie	Separations (	Option			
Waste Disposal Facility	P18	New Analytical Laboratory	30	2	60	15	6.0×10 <sup>-3</sup>
P49C P49D P49D P49D Class C Grout Plant Packaging and Shipping to a New P49D P49D P49D P49D P49D P49D P49D P49D	P27		49	2	98	25	9.8×10 <sup>-3</sup>
P49D         Class C Grout Packaging and Shipping to a New Low-Activity Waste Disposal Facility         41         2         82         21         8.2×10³           P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P118         Separations Organic Incinerator         2         2         4         1         4.0×10⁴           P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10³           Totals         Hot Isostatic Pressed Waste Option           Hot Isostatic Pressed Waste Option           P1A         Calcine SBW including NWCF Upgrades⁴         37         2         74         19         7.4×10³           P1A         Calcine SBW including NWCF Upgrades⁴         31         2         62         16         6.2×10³           P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9         3.6×10³           P18         New Analytical Laboratory         30         2         60         15         6.0×10³           P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P71         Mixing and Ho	P49A	Transuranic/Class C Separations	81	3	240	61	0.024
Low-Activity Waste Disposal Facility   P59A   Calcine Retrieval and Transport   100   1   100   26   0.010   P118   Separations Organic Incinerator   2   2   4   1   4.0×10 <sup>-4</sup>   P133   Waste Treatment Pilot Plant   25   2   50   13   5.0×10 <sup>-3</sup>   Totals   P18A   Calcine SBW including NWCF Upgrades <sup>6</sup>   37   2   74   19   7.4×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   Name of Hot Isostatic Pressed Waste Management   36   1   36   9   3.6×10 <sup>-3</sup>   P18   Name of Hot Isostatic Pressed Waste Management   36   1   36   9   3.6×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P59A   Calcine Retrieval and Transport   100   1   100   26   0.010   P71   Mixing and Hot Isostatic Pressed Waste   16   3   48   12   4.8×10 <sup>-3</sup>   P133   Waste Treatment Pilot Plant   25   2   50   13   5.0×10 <sup>-3</sup>   Totals   Direct Cement Waste Option   P14   Calcine SBW including NWCF Upgrades <sup>6</sup>   37   2   74   19   7.4×10 <sup>-3</sup>   P14   Calcine SBW including NWCF Upgrades <sup>6</sup>   37   2   74   19   7.4×10 <sup>-3</sup>   P15   P16   Calcine SBW including NWCF Upgrades <sup>6</sup>   31   2   62   16   6.2×10 <sup>-3</sup>   P18   NGLW and Tank Farm Heel Waste Management   36   1   36   9.0   3.6×10 <sup>-3</sup>   P18   NGLW and Tank Farm Heel Waste Management   36   1   36   9.0   3.6×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Analytical Laboratory   30   2   60   15   6.0×10 <sup>-3</sup>   P18   New Anal	P49C	Class C Grout Plant	64	2	130	32	0.013
P118	P49D		41	2	82	21	8.2×10 <sup>-3</sup>
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
Totals	P118	Separations Organic Incinerator	2	2	4	1	4.0×10 <sup>-4</sup>
Hot Isostatic Pressed Waste Option	P133	Waste Treatment Pilot Plant	25	2	_50	<u>13</u>	$5.0 \times 10^{-3}$
P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P71         Mixing and Hot Isostatic Pressed Waste         16         3         48         12         4.8×10 <sup>-3</sup> P72         Interim Storage of Hot Isostatic Pressed Waste         16         3         48         12         4.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup> Totals         Direct Cement Waste Option         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NW	Totals				770	190	0.077
P1A         Calcine SBW including NWCF Upgradese*         31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P71         Mixing and Hot Isostatic Pressing         150         5         730         180         0.073           P72         Interim Storage of Hot Isostatic Pressed Waste         16         3         48         12         4.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgradesed         37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgradese         31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New			ressed Waste	Option			
P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P71         Mixing and Hot Isostatic Pressing         150         5         730         180         0.073           P72         Interim Storage of Hot Isostatic Pressed Waste         16         3         48         12         4.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Ret	P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	37	2	74	19	$7.4 \times 10^{-3}$
P18	P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	31	2	62	16	$6.2 \times 10^{-3}$
P59A   Calcine Retrieval and Transport   100   1   100   26   0.010	P1B	NGLW and Tank Farm Heel Waste Management	36	1	36	9	3.6×10 <sup>-3</sup>
P71         Mixing and Hot Isostatic Pressing         150         5         730         180         0.073           P72         Interim Storage of Hot Isostatic Pressed Waste         16         3         48         12         4.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50 / 1.2×10 <sup>3</sup> 290         0.12           Direct Cement Waste Option           P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22			30	2	60	15	
P72   Interim Storage of Hot Isostatic Pressed Waste   16   3   48   12   4.8×10 <sup>-3</sup>		•	100	1	100	26	
P133 Totals         Waste Treatment Pilot Plant         25         2 $\frac{50}{1.2 \times 10^3}$ $\frac{13}{290}$ $\frac{5.0 \times 10^{-3}}{290}$ Direct Cement Waste Option           P1A Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19 $7.4 \times 10^{-3}$ P1A Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16 $6.2 \times 10^{-3}$ P1B NGLW and Tank Farm Heel Waste Management         36         1         36         9.0 $3.6 \times 10^{-3}$ P18 New Analytical Laboratory         30         2         60         15 $6.0 \times 10^{-3}$ P59A Calcine Retrieval and Transport         100         1         100         26 $0.010$ P80 Direct Cement Process         120         3         360         91 $0.036$ P81 Unseparated Cementitious HLW Interim Storage         88         1         88         22 $8.8 \times 10^{-3}$ P133 Waste Treatment Pilot Plant         25         2         50         13 $5.0 \times 10^{-3}$	P71	Mixing and Hot Isostatic Pressing	150	5	730	180	0.073
Totals         Direct Cement Waste Option           Direct Cement Waste Option           P1A Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18 New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A Calcine Retrieval and Transport         100         1         100         26         0.010           P80 Direct Cement Process         120         3         360         91         0.036           P81 Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133 Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	P72	Interim Storage of Hot Isostatic Pressed Waste	16	3	48	12	4.8×10 <sup>-3</sup>
Direct Cement Waste Option           P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	P133	Waste Treatment Pilot Plant	25	2		<u>13</u>	$5.0 \times 10^{-3}$
P1A         Calcine SBW including NWCF Upgrades <sup>d</sup> 37         2         74         19         7.4×10 <sup>-3</sup> P1A         Calcine SBW including NWCF Upgrades <sup>e</sup> 31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	Totals				$1.2 \times 10^3$	290	0.12
P1A         Calcine SBW including NWCF Upgradese         31         2         62         16         6.2×10 <sup>-3</sup> P1B         NGLW and Tank Farm Heel Waste Management         36         1         36         9.0         3.6×10 <sup>-3</sup> P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>			ent Waste Op				
P1B       NGLW and Tank Farm Heel Waste Management       36       1       36       9.0       3.6×10 <sup>-3</sup> P18       New Analytical Laboratory       30       2       60       15       6.0×10 <sup>-3</sup> P59A       Calcine Retrieval and Transport       100       1       100       26       0.010         P80       Direct Cement Process       120       3       360       91       0.036         P81       Unseparated Cementitious HLW Interim Storage       88       1       88       22       8.8×10 <sup>-3</sup> P133       Waste Treatment Pilot Plant       25       2       50       13       5.0×10 <sup>-3</sup>	P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	37	2	74	19	
P18         New Analytical Laboratory         30         2         60         15         6.0×10 <sup>-3</sup> P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	31	2	62	16	
P59A         Calcine Retrieval and Transport         100         1         100         26         0.010           P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	P1B	NGLW and Tank Farm Heel Waste Management	36	1	36	9.0	$3.6 \times 10^{-3}$
P80         Direct Cement Process         120         3         360         91         0.036           P81         Unseparated Cementitious HLW Interim Storage         88         1         88         22         8.8×10 <sup>-3</sup> P133         Waste Treatment Pilot Plant         25         2         50         13         5.0×10 <sup>-3</sup>	P18	· · · · · · · · · · · · · · · · · · ·	30	2	60	15	
P81 Unseparated Cementitious HLW Interim Storage 88 1 88 22 $8.8 \times 10^{-3}$ P133 Waste Treatment Pilot Plant 25 2 50 13 $5.0 \times 10^{-3}$	P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P133 Waste Treatment Pilot Plant 25 2 <u>50</u> <u>13</u> <u>5.0×10<sup>-3</sup></u>	P80	Direct Cement Process	120	3	360	91	0.036
<del>-</del> -	P81	-	88	1	88	22	
		Waste Treatment Pilot Plant	25	2			

C.3-29 DOE/EIS-0287

Table C.3-9. Estimated radiological impacts to involved workers during disposition activities for new facilities a,b,c (continued).

Project Number P18 P59A	Descrition  Early Vitrifica  New Analytical Laboratory  Calcine Retrieval and Transport	30 100	Disposition time (years)	Total workers  60 100	Collective dose (person-rem)	Estimated increase in latent cancer fatalities  6.0×10 <sup>-3</sup> 0.010 7.5×10 <sup>-3</sup>
P61 P88	Vitrified Product Interim Storage	25	3	75	19	0.039
P88 P133	Early Vitrification Facility Waste Treatment Pilot Plant	78 25	5	390	98	$5.0 \times 10^{-3}$
Totals	waste Treatment Phot Plant	25	2	50	<u>13</u>	0.068
Totals	Steam Reform	ina Ontion		680	170	0.008
P13	New Storage Tanks	19	2	38	10	3.8×10 <sup>-3</sup>
P35E	Class A Grout Packaging and Loading for Offsite Disposal	20	2	40	10	$4.0 \times 10^{-3}$
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P117A	Calcine Packaging and Loading	33	3	99	25	0.010
P2001	NGLW Grout Facility	9	1	9	2	$9.0 \times 10^{-4}$
P2002A	Steam Reforming Facility	45	1	45	<u>11</u>	$4.5 \times 10^{-3}$
Totals				330	83	0.033
	Minimum INEEL Pro	cessing Alte	rnative			
P18	New Analytical Laboratory	30	2	60	15	6.0×10 <sup>-3</sup>
P24	Vitrified Product Interim Storage	3	1.8	5.4	1.4	$5.4 \times 10^{-4}$
P27	Class A Grout Disposal in a New Low-Activity Waste Disposal Facility	88	2	180	44	0.018
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P111	SBW & NGLW Treatment with CsIX to CH TRU Grout & LLW Grout	59	1	59	15	5.9×10 <sup>-3</sup>
P117A	Calcine Packaging and Loading	33	3	99	25	0.010
P133	Waste Treatment Pilot Plant	25	2	_50	<u>13</u>	$5.0 \times 10^{-3}$
Totals				550	140	0.055
	Vitrification without Cale	cine Separati	ions Option			
P13	New Storage Tanks	15	2	30	7.5	3.0×10 <sup>-3</sup>
P18	New Analytical laboratory	30	2	60	15	$6.0 \times 10^{-3}$
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P61	Vitrified Product Interim Storage	25	3	75	19	$7.5 \times 10^{-3}$
P88	Vitrification with MACT	78	5	390	98	0.039
P133	Waste Treatment Pilot Plant	25	2	_50	13	$5.0 \times 10^{-3}$
Totals				710	180	0.071

Table C.3-9. Estimated radiological impacts to involved workers during disposition activities for new facilities a,b,c (continued).

Project number	Description	Radiation workers/ year	Disposition time (years)	Total workers	Collective dose (person- rem)	Estimated increase in latent cancer fatalities
	Vitrification with Calcin	ne Separatio	ns Option			
P9A	Full Separations	100	3	310	77	0.031
P9C	Grout Plant	74	2.5	190	46	0.019
P13	New Storage Tanks	15	2	30	7.5	$3.0 \times 10^{-3}$
P18	New Analytical Laboratory	30	2	60	15	$6.0 \times 10^{-3}$
P24	Vitrified Product Interim Storage	3	1.8	5.4	1.4	5.4×10 <sup>-4</sup>
P35E	Grout Packaging and Loading for Offsite Disposal	20	2	40	10	$4.0 \times 10^{-3}$
P59A	Calcine Retrieval and Transport	100	1	100	26	0.010
P88	Vitrification with MACT	78	5	390	98	0.039
P133	Waste Treatment Pilot Plant	25	2	50	<u>13</u>	$5.0 \times 10^{-3}$
Totals				$1.2 \times 10^{3}$	290	0.12

Source: Data from Project Data Sheets in Appendix C.6.

C.3-31DOE/EIS-0287

Only includes projects with potential for radiation exposure during disposition.

The EIS analyzes treatment of post-2005 newly generated liquid waste as mixed transuranic waste/SBW for comparability of impacts between alternatives. The newly generated liquid waste could be treated in the same facility as the mixed transuranic waste/SBW or DOE could construct a separate facility to grout the newly generated liquid waste. For the New Waste Calcining Facility MACT Facility.

For the liquid waste storage tank.

CH TRU = contact-handled transuranic waste; CsIX = cesium ion exchange; LLW = low-level waste; MACT = maximum achievable control technology; NGLW = newly generated liquid waste; TRU = transuranic.

Table C.3-10. Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative.<sup>a</sup>

Project number	Description	of workers per				
		year	Disposition time (years)	number of workers	Total lost workdays <sup>b</sup>	recordable cases <sup>c</sup>
P1A	*	d Current Operati			Workdays	cases
	Calcine SBW including NWCF	58	2	120	33	4.3
P1A	Upgrades <sup>d</sup> Calcine SBW including NWCF	42	2	84	24	3.1
D1D	Upgrades <sup>e</sup>	40		40	1.4	1.0
P1B	NGLW and Tank Farm Heel Waste Management	48	1	<u>48</u>	<u>14</u>	1.8
Totals				250	70	9.2
		Full Separations (	Option			
P9A	Full Separations	220	3	670	190	25
P9B	Vitrification Plant	72	3	220	61	8.0
P9C	Class A Grout Plant	120	2.5	300	85	11
P18	New Analytical Laboratory	88	2	180	50	6.5
P24	Vitrified Product Interim Storage	31	1.8	56	16	2.1
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	2.1	0.25	0.53	0.15	0.019
P27	Class A Grout Disposal in a New Low- Activity Waste Disposal Facility	140	2	270	77	10
P35D	Class A Grout Packaging and Shipping to a New Low-Activity Waste Disposal Facility	30	2	60	17	2.2
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P118	Separations Organic Incinerator	2	2	4	1.1	0.15
P133	Waste Treatment Pilot Plant	45	2	<u>90</u>	<u>26</u>	3.3
Totals				$2.0 \times 10^{3}$	570	74
		Planning Basis C	ption			
P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	58	2	120	33	4.3
P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	42	2	84	24	3.1
P1B	NGLW and Tank Farm Heel Waste Management	48	1	48	14	1.8
P18	New Analytical Laboratory	88	2	180	50	6.5
P23A	Full Separations	220	3	660	190	24
P23B	Vitrification Plant	72	2.8	200	57	7.5
P23C	Class A Grout Plant	120	2.8	340	95	12
P24	Vitrified Product Interim Storage	31	1.8	56	16	2.1
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	2.1	0.25	0.53	0.15	0.019
P35E	Class A Grout Packaging and Loading for Offsite Disposal	30	2	60	17	2.2
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P118	Separations Organic Incinerator	2	2	4	1.1	0.15
P133 Totals	Waste Treatment Pilot Plant	45	2	$\frac{90}{2.0 \times 10^3}$	<u>26</u> 570	<u>3.3</u> 74

Table C.3-10. Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative (continued).

	facilities at INEEL by al	Total number	· · · · · · · · · · · · · · · · · · ·	Total		Total
Project		of workers per		number of	Total lost	recordable
number	Description	year	time (years)	workers	workdays <sup>b</sup>	cases <sup>c</sup>
7.10		suranic Separatio	_	100		
P18	New Analytical Laboratory	88	2	180	50	6.5
P27	Class A Grout Disposal in a New Low- Activity Waste Disposal Facility	140	2	270	77	10
P39A	Packaging and Loading TRU at INTEC for Shipment to the Waste Isolation Pilot Plant	7	1.5	11	3.0	0.39
P49A	Transuranic/Class C Separations	150	3	450	130	17
P49C	Class C Grout Plant	93	2	190	53	6.9
P49D	Class C Grout Packaging and Shipping to a New Low-Activity Waste Disposal Facility	57	2	110	32	4.2
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P118	Separations Organic Incinerator	2	2	4	1.1	0.15
P133	Waste Treatment Pilot Plant	45	2	90	<u>26</u>	3.3
Totals				$1.5 \times 10^3$	420	54
	Hot Is	ostatic Pressed W	Vaste Option			
P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	58	2	120	33	4.3
P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	42	2	84	24	3.1
P1B	NGLW and Tank Farm Heel Waste Management	48	1	48	14	1.8
P18	New Analytical Laboratory	88	2	180	50	6.5
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P71	Mixing and Hot Isostatic Pressing	200	5	$1.0 \times 10^{3}$	280	37
P72	Interim Storage of Hot Isostatic Pressed Waste	150	3	450	130	17
P73A	Packaging and Loading Hot Isostatic Pressed Waste at INTEC for Shipment	7	1	7	2.0	0.26
P133	to a Geologic Repository Waste Treatment Pilot Plant	45	2	90	26	2 2
Totals	waste Treatment I not I fant	43	2	$\frac{90}{2.1 \times 10^3}$	<u>26</u> 610	3.3 79
	Dir	ect Cement Was	te Option			
P1A	Calcine SBW including NWCF Upgrades <sup>d</sup>	58	2	120	33	4.2
P1A	Calcine SBW including NWCF Upgrades <sup>e</sup>	42	2	84	24	3.1
P1B	NGLW and Tank Farm Heel Waste Management	48	1	48	14	1.8
P18	New Analytical Laboratory	88	2	180	50	6.5
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P80	Direct Cement Process	160	3	480	140	11
P81	Unseparated Cementitious HLW Interim Storage	290	1	290	82	11
P83A	Packaging and Loading Cementitious Waste at INTEC for Shipment to a Geologic Repository	7	1	7	2.0	0.26
P133 Totals	Waste Treatment Pilot Plant	45	2	$\frac{90}{1.4\times10^3}$	<u>26</u> 410	3.3 54

Table C.3-10. Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative (continued).

Project number	Description	Total number of workers per year	Disposition time (years)	Total number of workers	Total lost workdays <sup>b</sup>	Total recordable cases <sup>c</sup>
number	*	arly Vitrification		WOIKCIS	workdays	cases
P18	New Analytical Laboratory	88	2.	180	50	6.5
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P61	Unseparated Vitrified Product Interim	250	3	750	210	28
	Storage					
P62A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	10	3	30	8.5	1.1
P90A	Packaging and Loading Vitrified SBW at INTEC for Shipment to Waste Isolation Pilot Plant	7	1.5	11	3.0	0.39
P88	Early Vitrification Facility	120	5	590	170	22
P133	Waste Treatment Pilot Plant	45	2	90	<u>26</u>	3.3
Totals				$1.8 \times 10^{3}$	510	67
	S	Steam Reforming	Option			
P13	New Storage Tanks	19	2	38	11	1.4
P35E	Class A Grout Packaging and Loading for Offsite Disposal	30	2	60	17	2.2
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P117A	Calcine Packaging and Loading	52	3	160	44	5.8
P2001	NGLW Grout Facility	16	1	16	4.5	0.59
P2002A	Steam Reforming Facility	72	1	<u>72</u>	_20	2.7
Totals				500	140	19
	Minimur	n INEEL Process	ing Alternative	e		
P18	New Analytical Laboratory	88	2	180	50	6.5
P24	Vitrified Product Interim Storage	31	1.8	56	16	2.1
P25A	Packaging and Loading Vitrified HLW at INTEC for Shipment to a Geologic Repository	2.1	0.25	0.53	0.15	0.19
P27	Class A Grout Disposal in a New Low- Activity Waste Disposal Facility	140	2	270	77	10
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P111	SBW & NGLW Treatment with CsIX to CH TRU Grout & LLW Grout	100	1	100	28	3.7
P112A	Packaging and Loading Contact Handled TRU for Shipment to WIPP	7	4.5	32	8.9	1.2
P117A	Calcine Packaging and Loading	110	3	330	94	12
P133	Waste Treatment Pilot Plant	45	2	90	<u>26</u>	3.3
Totals				$1.2 \times 10^{3}$	350	45

Table C.3-10. Estimated worker injury impacts during disposition activities of new facilities at INEEL by alternative (continued).

		Total number of		Total		Total
Project		workers per	Disposition	number of	Total lost	recordable
number	Description	year	time (years)	workers	workdays <sup>b</sup>	cases <sup>c</sup>
	Vitrification	without Calcine	Separations Op	ption		
P13	New Storage Tanks	19	2	38	11	1.4
P18	New Analytical Laboratory	88	2	180	50	6.5
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P61	Vitrified HLW Interim Storage	250	3	750	210	28
P62A	Packaging and Loading Vitrified HLW at	10	3	30	8.5	1.1
	INTEC for Shipment to a Geologic					
DOO	Repository	120	-	500	170	22
P88	Vitrification with MACT	120	5 2	590	170	22
P133	Waste Treatment Pilot Plant	45	2	$\frac{90}{1.8\times10^3}$	<u>26</u>	3.3 68
Totals	¥7., .w. ,.	:1 0 1 : 0	. 0 .		520	08
		n with Calcine So				
P9A	Full Separations	220	3	670	190	25
P9C	Grout Plant	120	2.5	300	85	11
P13	New Storage Tanks	19	2	38	11	1.4
P18	New Analytical Laboratory	88	2	180	50	6.5
P24	Vitrified Product Interim Storage	31	1.8	56	16	2.1
P25A	Packaging and Loading Vitrified HLW for Shipment to a Geologic Repository	2.1	0.25	0.53	0.15	0.019
P35E	Grout Packaging and Loading for Offsite Disposal	30	2	60	17	2.2
P59A	Calcine Retrieval and Transport	160	1	160	45	5.9
P88	Vitrification Facility with MACT	120	5	590	170	22
P133	Waste Treatment Pilot Plant	45	2	90	<u>26</u>	3.3
Totals				$2.1 \times 10^{3}$	610	79

a. The EIS analyzes treatment of post-2005 newly generated liquid waste as mixed transuranic waste/SBW for comparability of impacts between alternatives. The newly generated liquid waste could be treated in the same facility as the mixed transuranic waste/SBW or DOE could construct a separate facility to grout the newly generated liquid waste.

CH TRU = contact-handled transuranic waste; CsIX = cesium ion exchange; FUETAP = formed under elevated temperature and process; HLW = high-level waste; LLW = low-level waste; MACT = maximum achievable control technology; NGLW = newly generated liquid waste; TRU = transuranic waste; WIPP = Waste Isolation Pilot Plant.

C.3-35 DOE/EIS-0287

b. The number of workdays beyond the day of injury or onset of illness the employee was away from work or limited to restricted work activity because of an occupational injury or illness.

c. A recordable case includes work-related death, illness, or injury which resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

d. For the New Waste Calcining Facility with Maximum Achievable Control Technology upgrades.

e. For the liquid waste storage tank.

## Appendix C.3 References

DOE (Department of Energy), 2001, Occupational Injury and Property Damage Summary, January-December 2001, available online <a href="http://tis-hq.eh.doe.gov/cairs/cairs/summary/oipds014/sum.html">http://tis-hq.eh.doe.gov/cairs/cairs/summary/oipds014/sum.html</a>, accessed April 17, 2002.

NCRP (National Council on Radiation Protection and Measurements), 1993, *Limitations of Exposure to Ionizing Radiation*, Report Number 116, Washington, D.C.